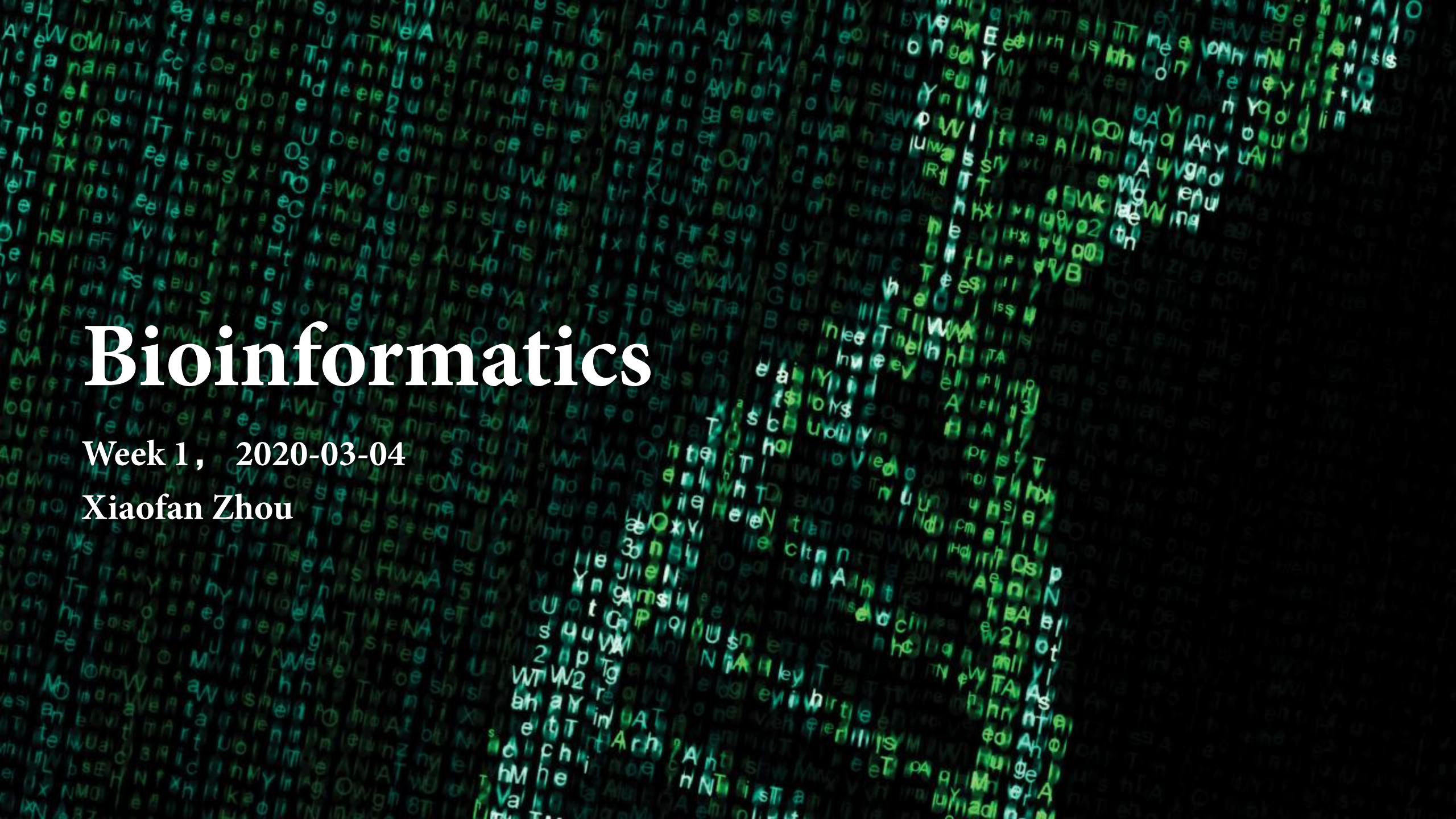
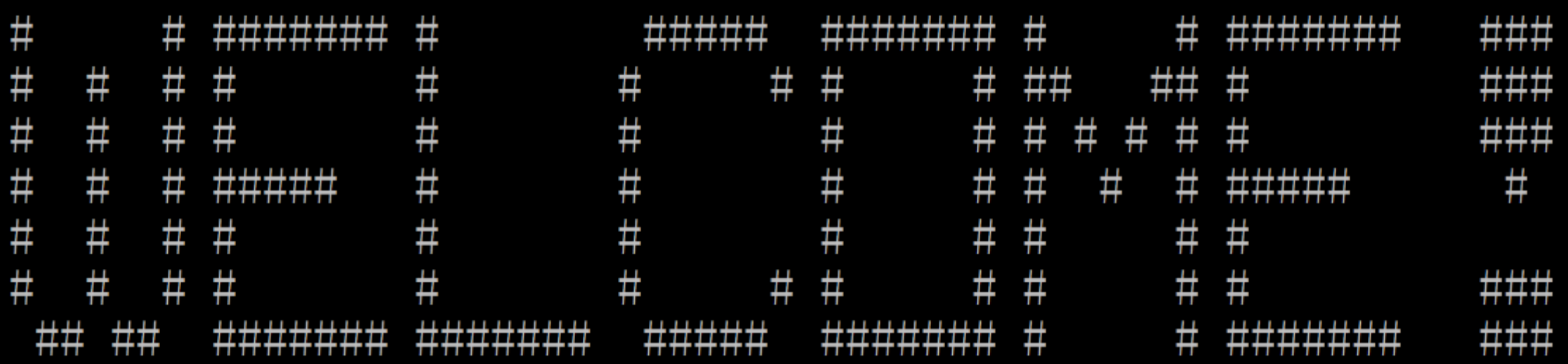


Bioinformatics

Week 1， 2020-03-04

Xiaofan Zhou



Week 1: Introduction to …

- The participants
- The course
- The discipline

Who am I?

- Xiaofan Zhou（周筱帆）
  - Professor, Integrative Microbiology Research Centre, SCAU

- Research interests:
  - molecular evolution, genomics, and other things

- Education:
  - 2001 – 2005: B.S., Biotechnology, SJTU
  - 2006 – 2011: Ph.D., Cell and Developmental Biology, PSU

- Experience:
  - 2011 – 2016: Postdoc, Vanderbilt University
  - 2016 – Present: Professor, SCAU

Week 1: Introduction to …

- The participants

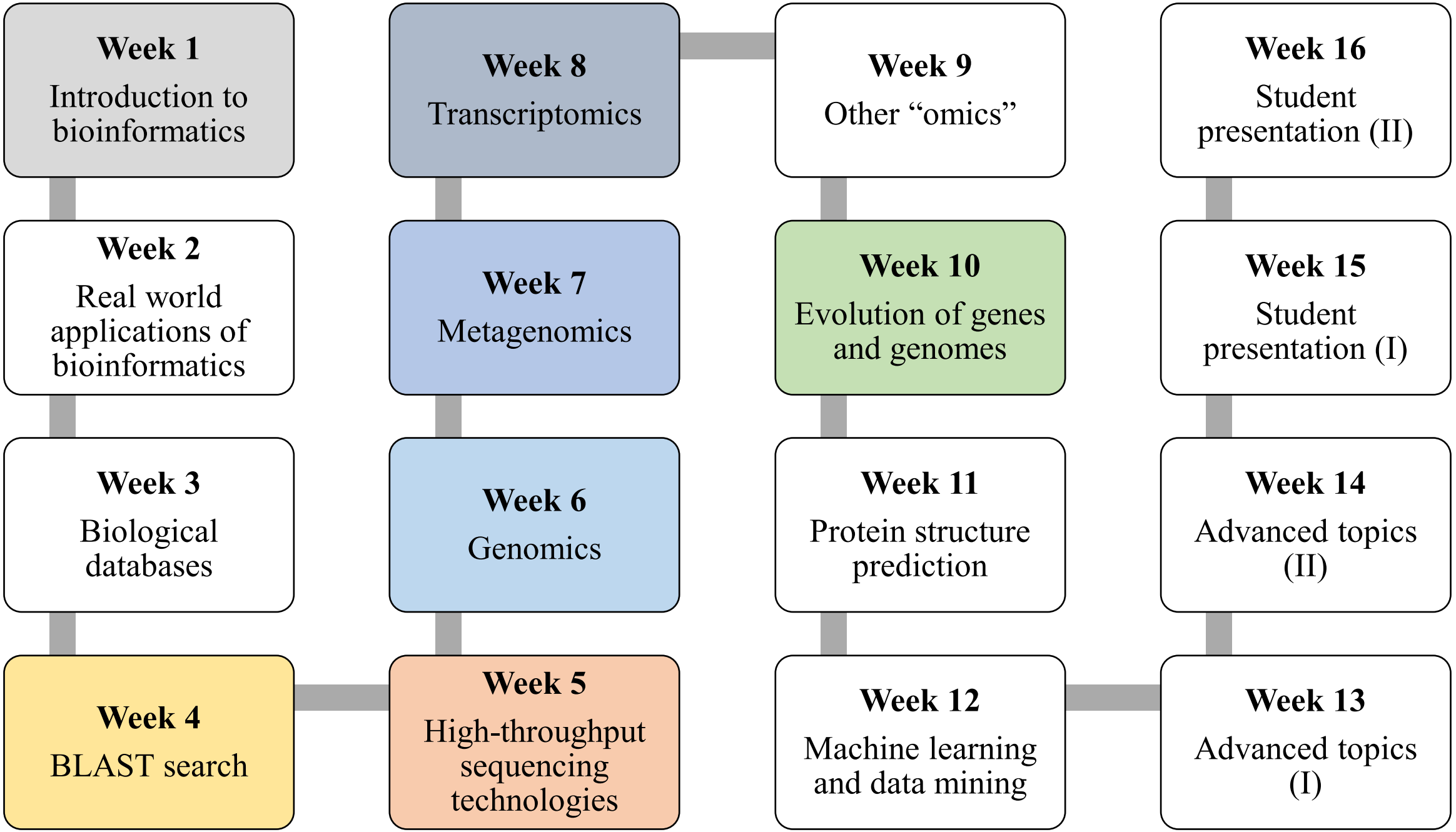
- The course

Course overview

- Prerequisite:
  - basic biology knowledge and computer skills
  - personal computer (for the practical session)

- Aim:
  - to introduce core concepts and methods in bioinformatics

- Organization:
  - coordinated lecture and practical sessions


Week 1
Introduction to bioinformatics
Week 2
Real world applications of bioinformatics
Week 3
Biological databases
Week 4
BLAST search
Week 5
High-throughput sequencing technologies
Week 6
Genomics
Week 7
Metagenomics
Week 8
Transcriptomics
Week 9
Other “omics”
Week 10
Evolution of genes and genomes
Week 11
Protein structure prediction
Week 12
Machine learning and data mining
Week 13
Advanced topics (I)
Week 14
Advanced topics (II)
Week 15
Student presentation (I)
Week 16
Student presentation (II)

Course overview

- Prerequisite:
  - basic biology knowledge and computer skills
  - personal computer (for the practical session)
- Aim:
  - to introduce core concepts and methods in bioinformatics
- Organization:
  - alternate lecture and practical session
- Grading policy:
  - 50%: attendance, homework, presentation
  - 50%: final exam

Week 1: Introduction to …

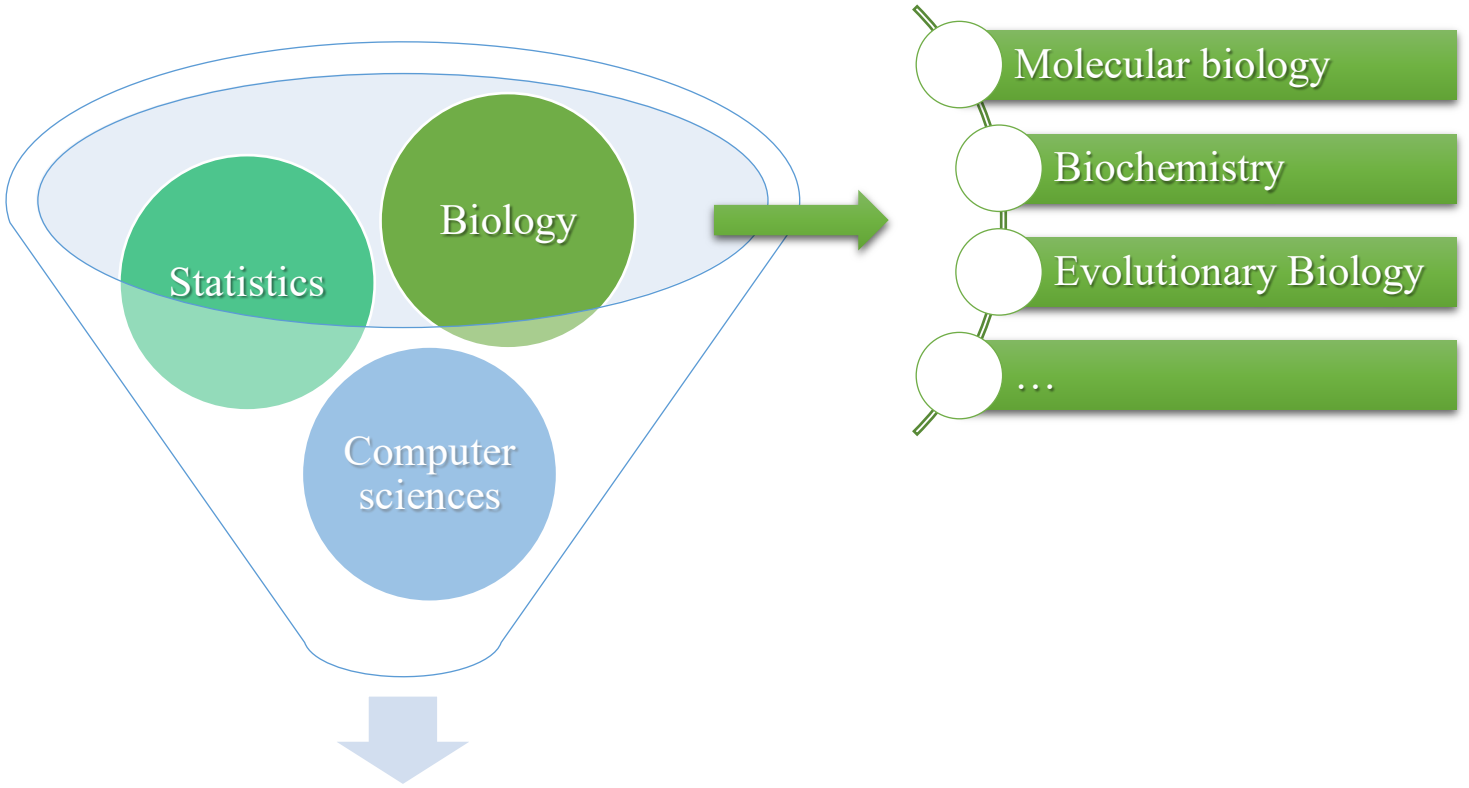
- The participants
- The course
- The discipline

What is bioinformatics?

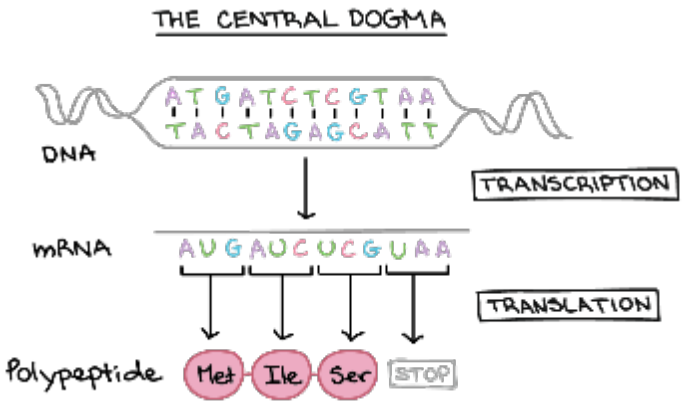
- NIH working definition:
  - Bioinformatics: "*Research, development, or application of computational tools and approaches for expanding the use of biological, medical, behavioral or health data, including those to acquire, store, organize, archive, analyze, or visualize such data.*"

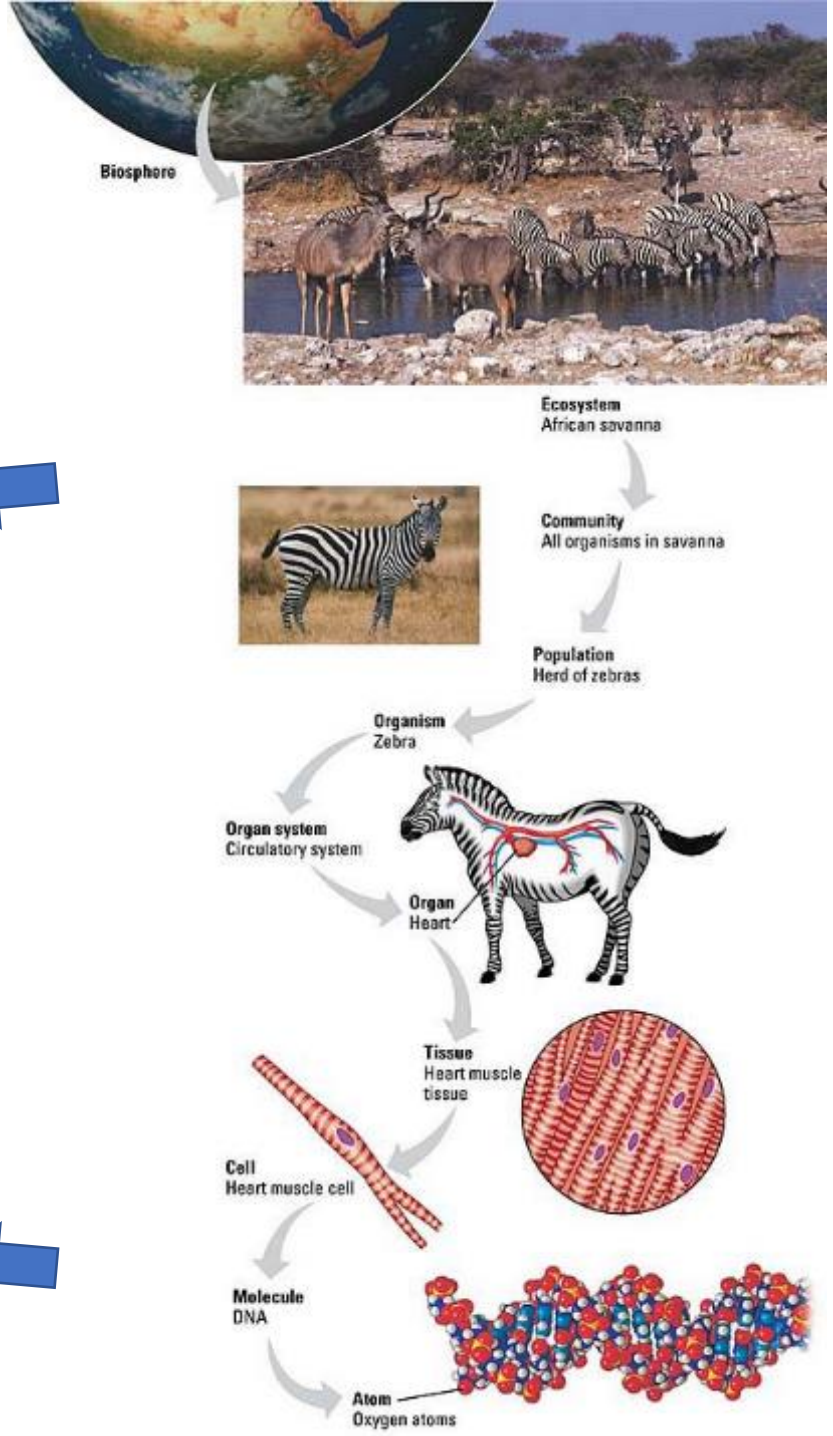
"Application of computer to biology"

Core components of bioinformatics

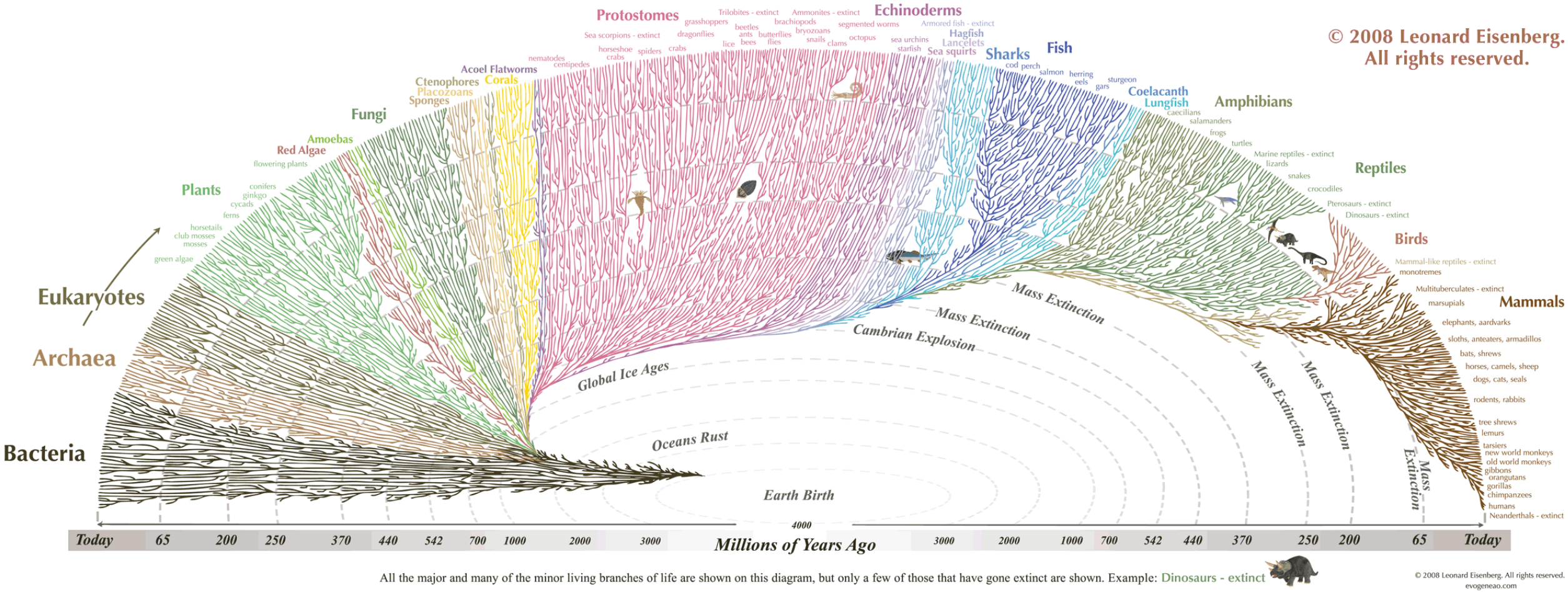


From micro to macro





From past to present

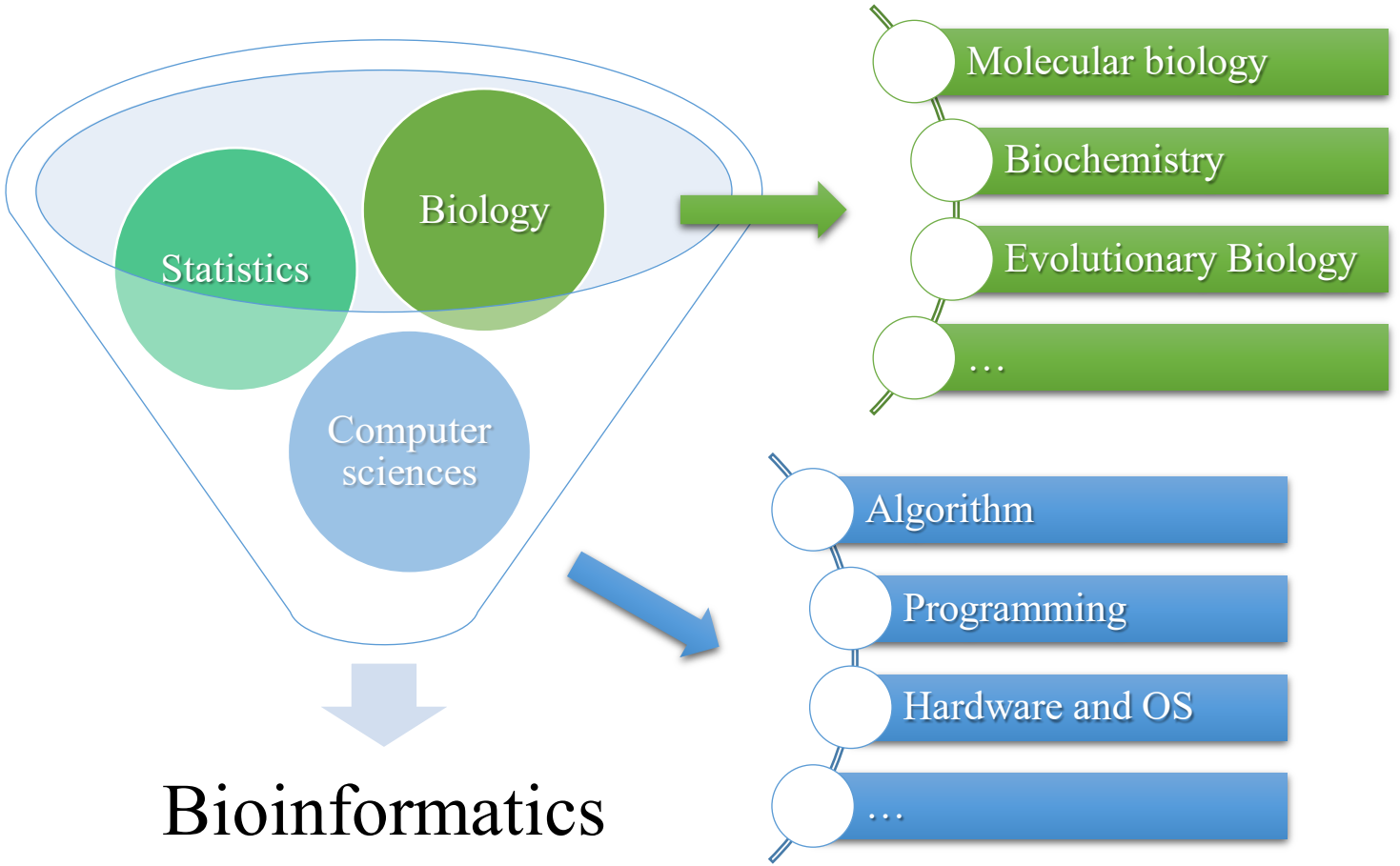


All the major and many of the minor living branches of life are shown on this diagram, but only a few of those that have gone extinct are shown. Example: Dinosaurs - extinct

© 2008 Leonard Eisenberg. All rights reserved.
evogeneao.com

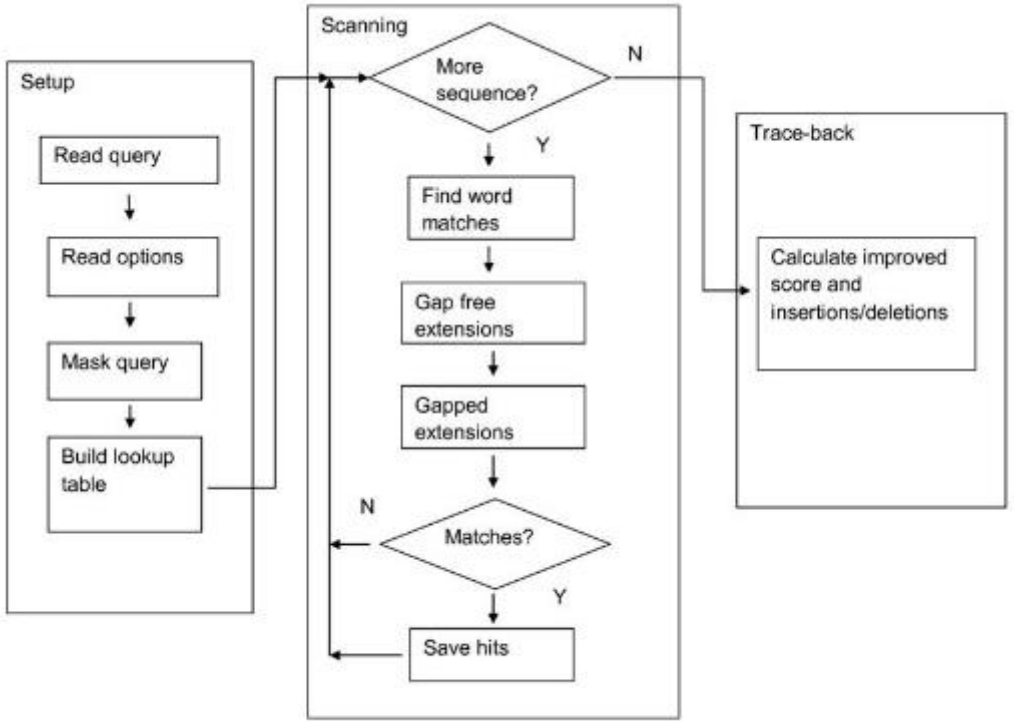
Fighting the coronavirus

Core components of bioinformatics

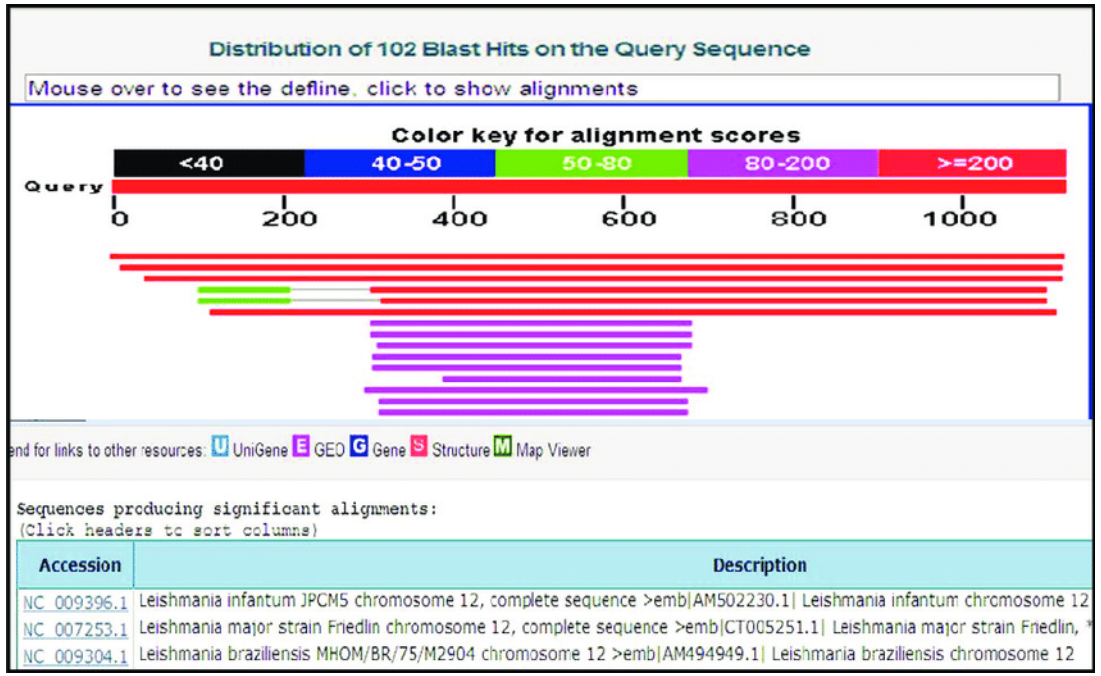


“Hardcore” vs. “softcore” bioinformatics

Making tools



Using tools



Bioinformatics vs. Computation Biology

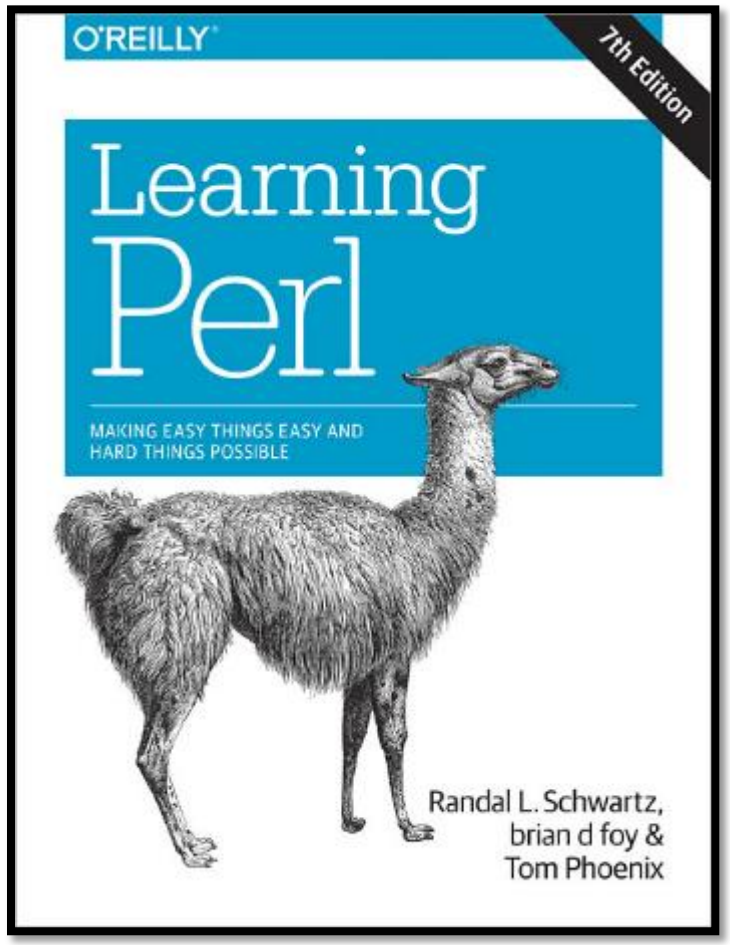
- NIH working definition:
  - Bioinformatics: "*Research, development, or application of computational tools and approaches for expanding the use of biological, medical, behavioral or health data, including those to acquire, store, organize, archive, analyze, or visualize such data.*"

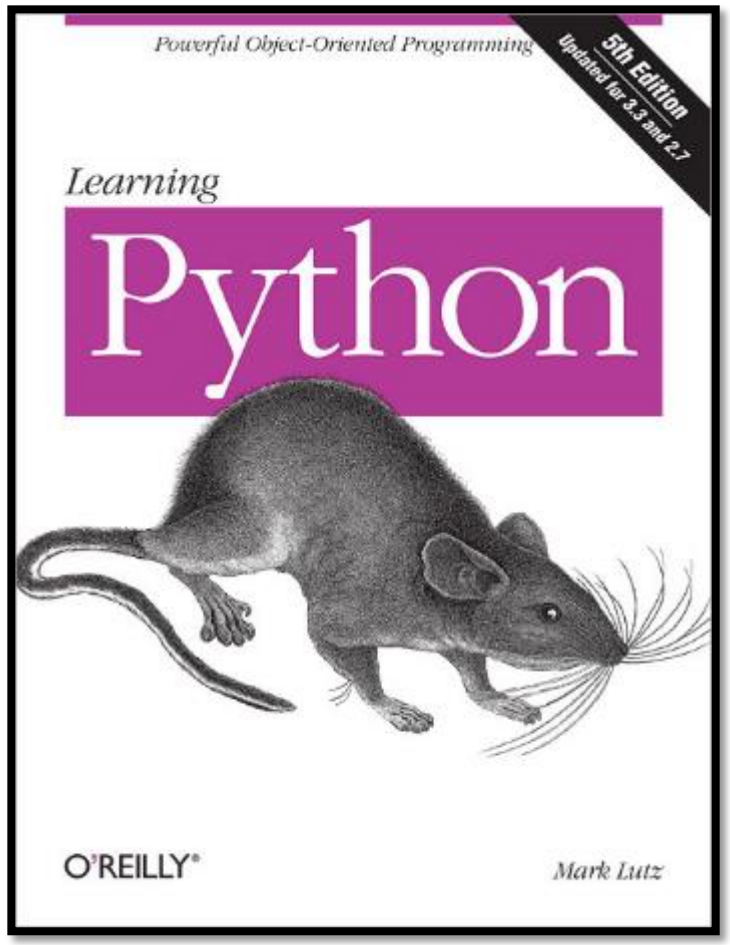
  - Computational Biology: "*The development and application of data-analytical and theoretical methods, mathematical modeling and computational simulation techniques to the study of biological, behavioral, and social systems.*"

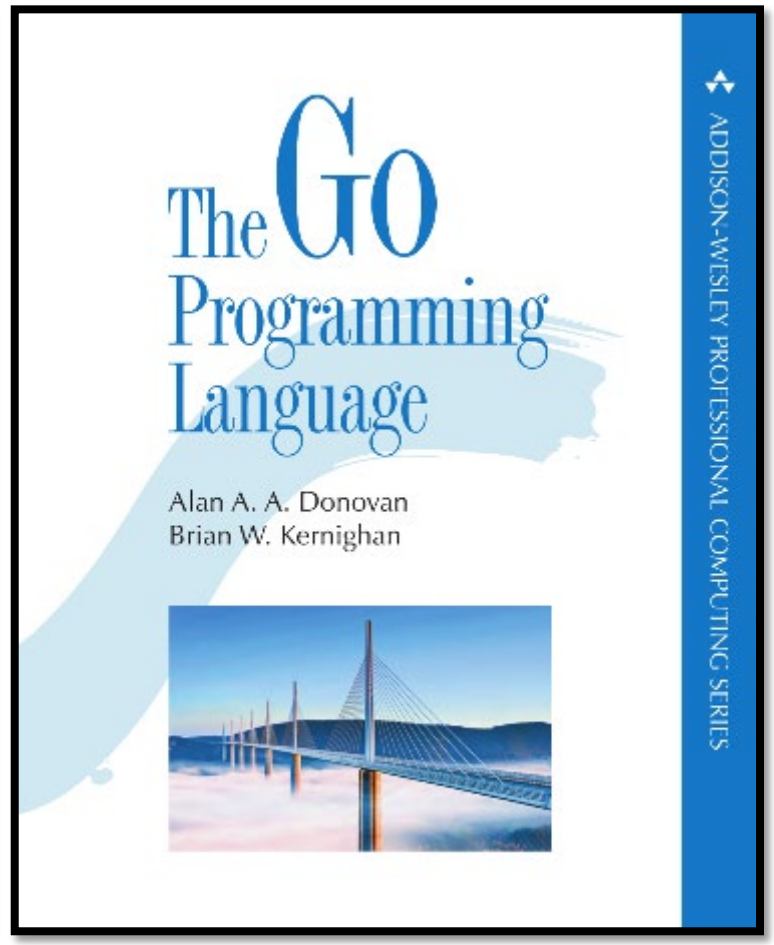
Self-learning resources

- Books
- Open courses
- Online platforms
- Journals

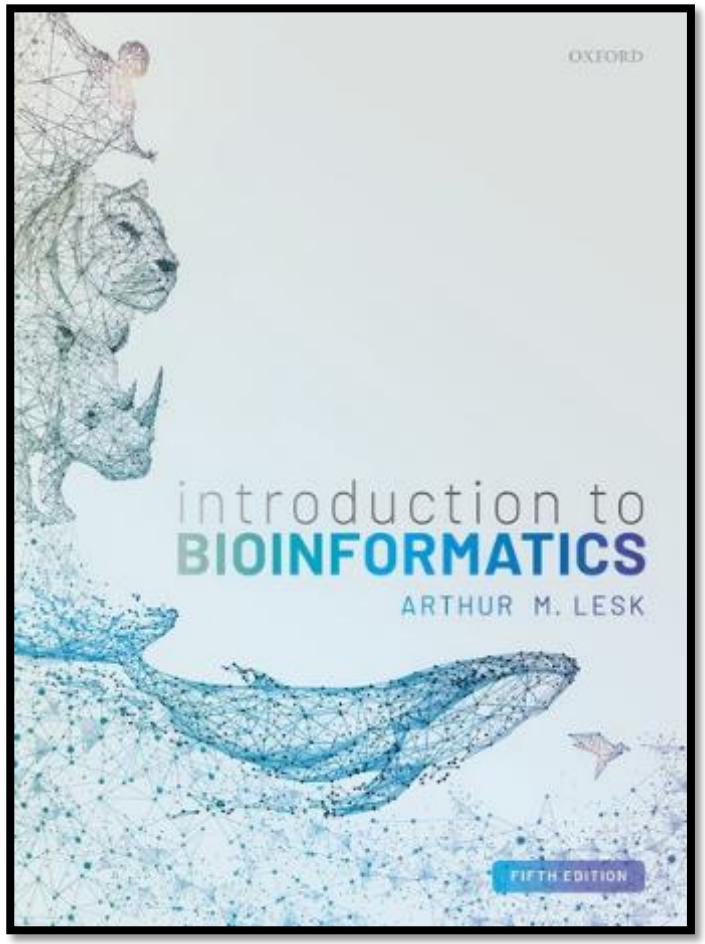
Programming language

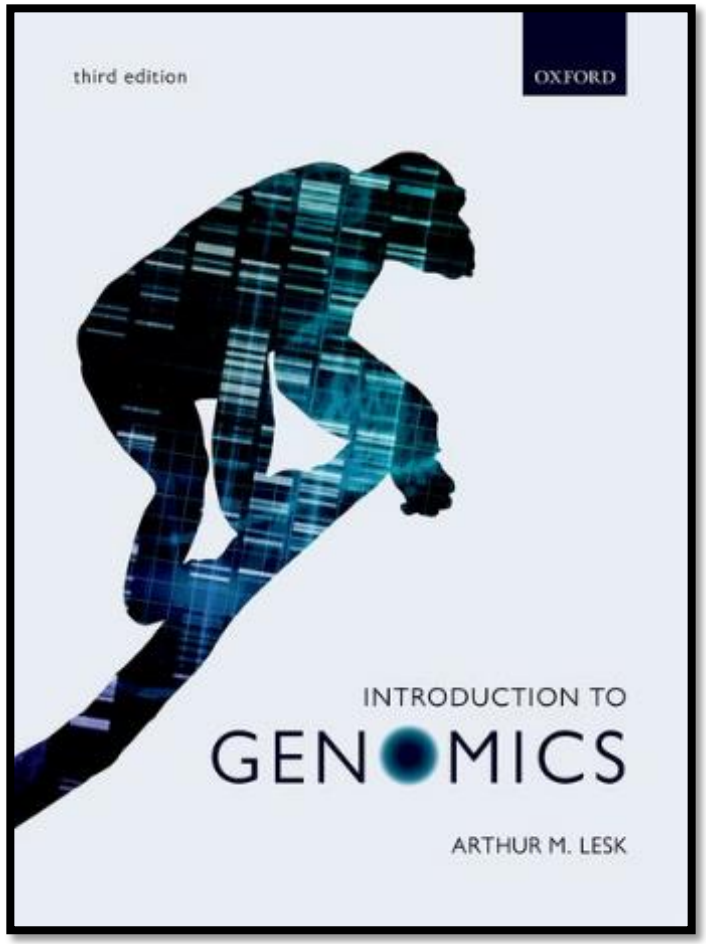


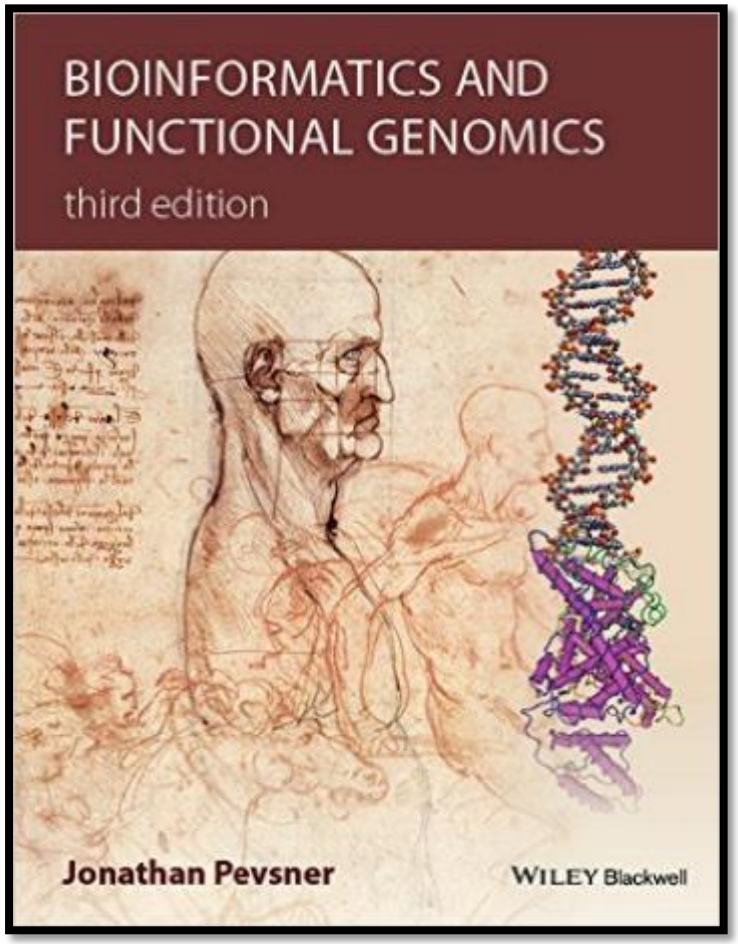




Bioinformatics & Genomics



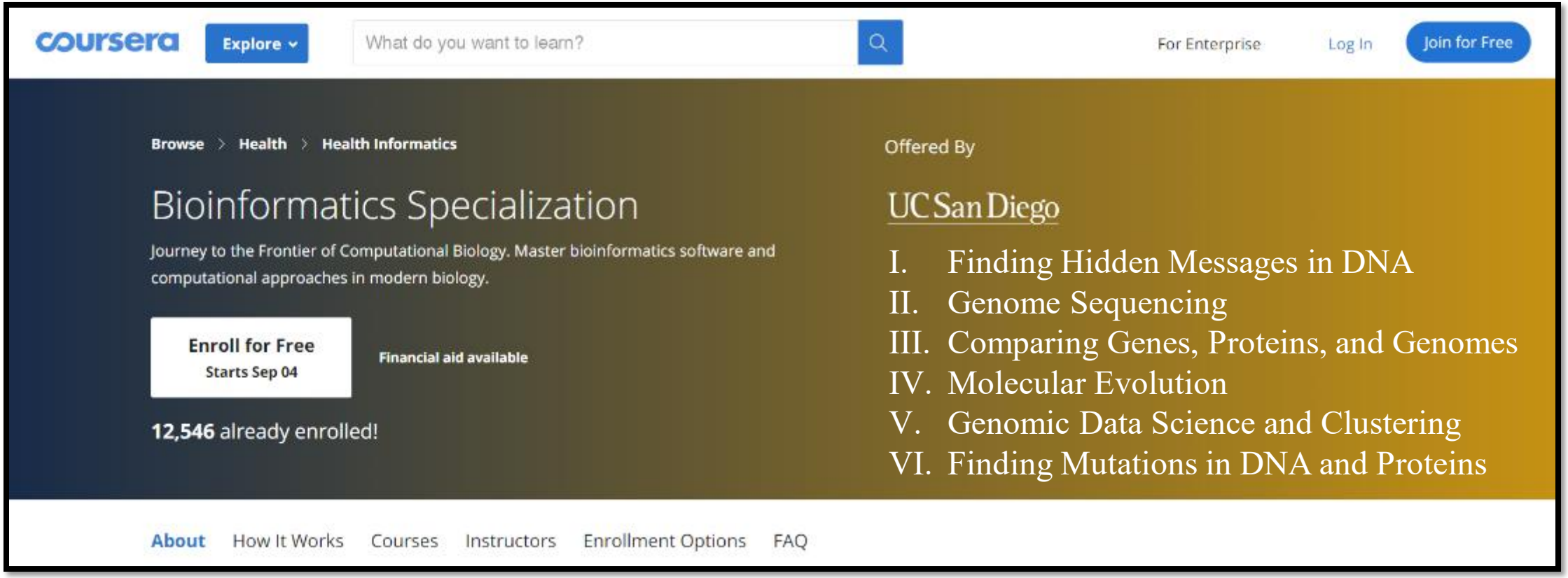




Open courses

https://zh.coursera.org/learn/sheng-wu-xin-xi-xue

Open courses

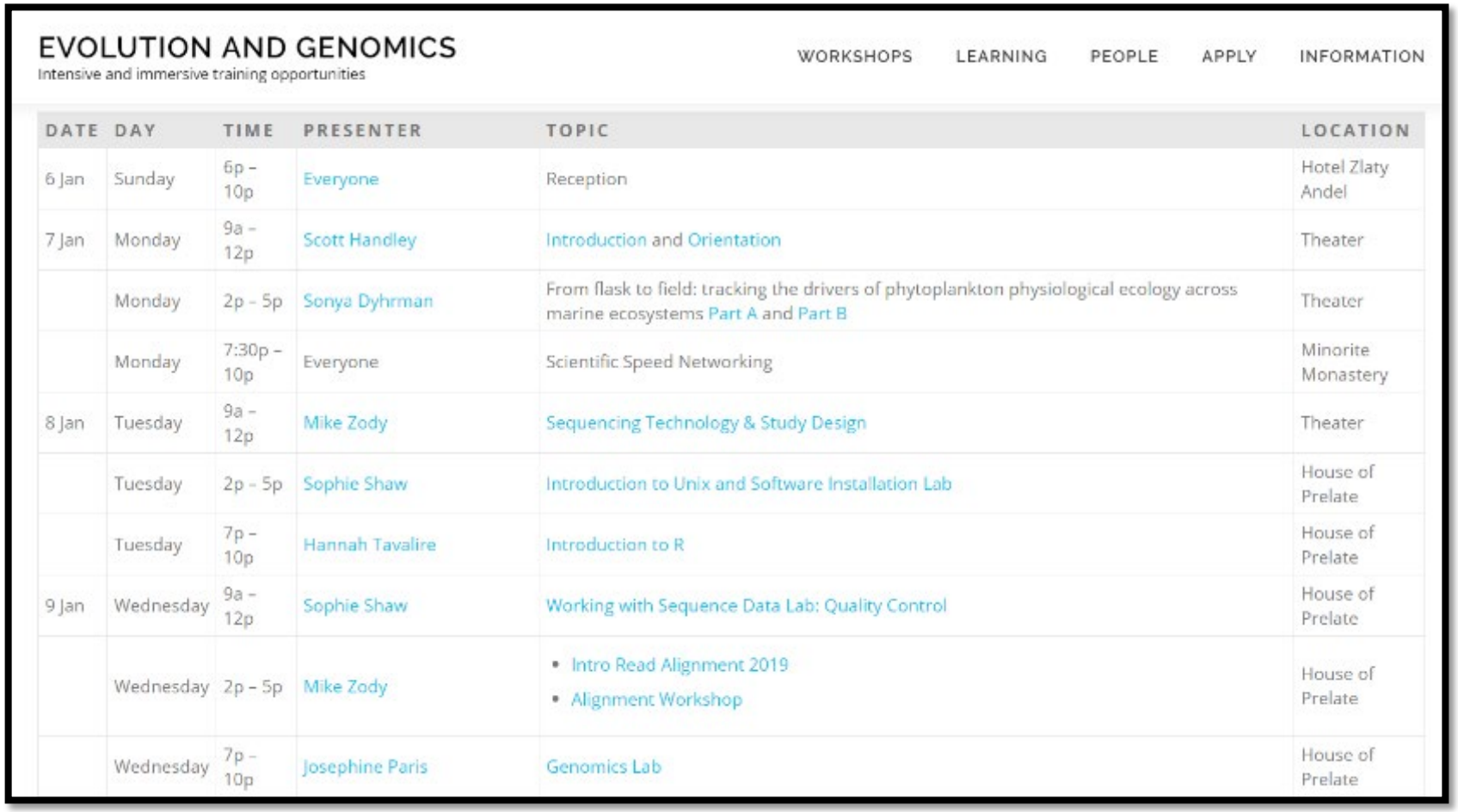


https://www.coursera.org/specializations/bioinformatics

Open courses

http://evomics.org/

Open courses



EVOLUTION AND GENOMICS

Intensive and immersive training opportunities

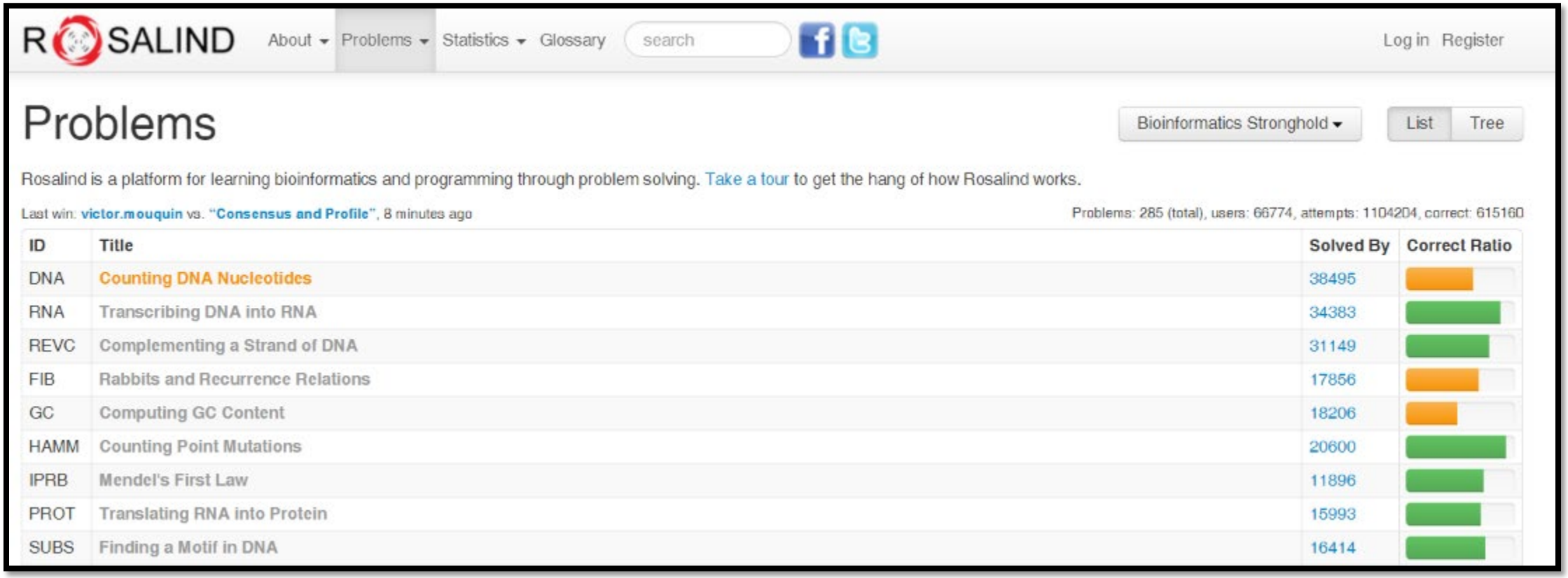
WORKSHOPS LEARNING PEOPLE APPLY INFORMATION

DATE	DAY	TIME	PRESENTER	TOPIC	LOCATION
6 Jan	Sunday	6p – 10p	Everyone	Reception	Hotel Zlaty Andel
7 Jan	Monday	9a – 12p	Scott Handley	Introduction and Orientation	Theater
	Monday	2p – 5p	Sonya Dyhrman	From flask to field: tracking the drivers of phytoplankton physiological ecology across marine ecosystems Part A and Part B	Theater
	Monday	7:30p – 10p	Everyone	Scientific Speed Networking	Minorite Monastery
8 Jan	Tuesday	9a – 12p	Mike Zody	Sequencing Technology & Study Design	Theater
	Tuesday	2p – 5p	Sophie Shaw	Introduction to Unix and Software Installation Lab	House of Prelate
	Tuesday	7p – 10p	Hannah Tavalire	Introduction to R	House of Prelate
9 Jan	Wednesday	9a – 12p	Sophie Shaw	Working with Sequence Data Lab: Quality Control	House of Prelate
	Wednesday	2p – 5p	Mike Zody	• Intro Read Alignment 2019 • Alignment Workshop	House of Prelate
	Wednesday	7p – 10p	Josephine Paris	Genomics Lab	House of Prelate

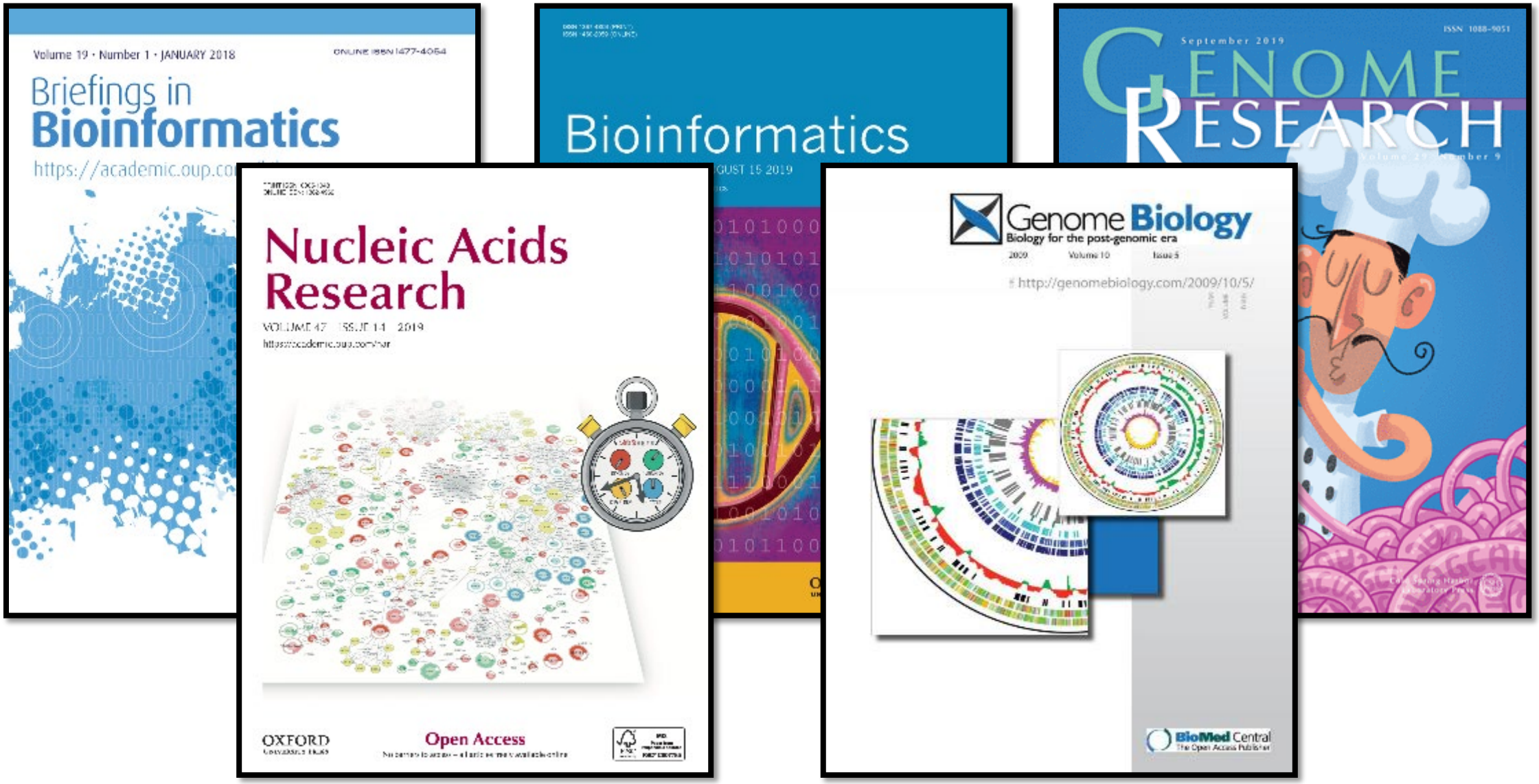
Online platform

http://rosalind.info/problems/locations/

Online platform



Journals


Volume 19 · Number 1 · JANUARY 2018
Briefings in
Bioinformatics
Bioinformatics
September 2019
GENOME
RESEARCH
Nucleic Acids
Research
OXFORD
Open Access
Genome Biology
Biology for the post-genomic era
http://genomebiology.com/2009/10/5/
BioMed Central

Finally…

无法访问此网站
www.google.com 意外终止了连接。
请试试以下办法：
检查网络连接
检查代理服务器和防火墙
运行 Windows 网络诊断
ERR_CONNECTION_CLOSED
重新加载
详细信息

Questions?